SQL

BASIC STEP BY STEP ADVANCE

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https://github.com/yaswanthteja/Complete_SQL/

Complete SQL With Notes

1. Introduction to SQL-What Is SQL & Database
2. Data Types, Primary-Foreign Keys & Constraints
   a. Install postgresql and pgadmin4
3. Create Table In SQL & Create Database
4. INSERT UPDATE, DELETE & ALTER Table
5. SELECT Statement & WHERE Clause with Example
6. How To Import Excel File (CSV) to SQL
7. Functions in SQL & String Function
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WHAT IS SQL & DATABASE-INTRODUCTION

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Basics of Data & Databases

1. **What is Data?**

- Data is **raw facts and figures** that by themselves may not have meaning.
- Think of data as individual Lego blocks — on their own they're just pieces, but when arranged, they form meaningful structures.

Examples: Numbers, Text, Dates

2. Data Sizes & Storage Capacities

- Computers store data in **bits and bytes**.
- 1 bit Smallest unit (0 or 1)

Common data storage measurements

Unit	Value
bit	1 bit
byte	8 bits
kilobyte	1,024 bytes
megabyte	1,024 kilobytes
gigabyte	1,024 megabytes
terabyte	1,024 gigabytes
petabyte	1,024 terabytes
exabyte	1,024 petabytes
zettabyte	1,024 exabytes
yottabyte	1,024 zettabytes
brontobyte	1,024 yottabytes

What is Database?

Database is a system that allow users to store and organise data

Excel v/s Database

Excel	Database
Easy to use- untrained person can work	Trained person can work
Data stored less data	Stores large amount of data
Good for one time analysis, quick charts	Can automate tasks
No data integrity due to manual operation	High data integrity
Low search/filter capabilities	High search/filter capabilities

Data Warehouse

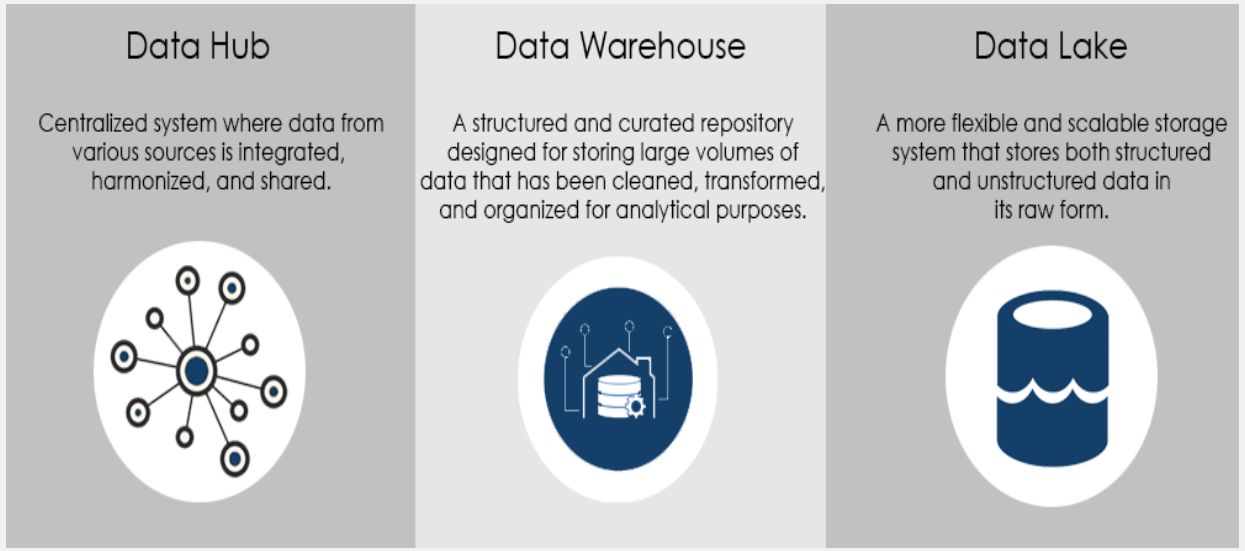
A **data warehouse** is a large, organized storage system that holds cleaned and structured data from different sources.

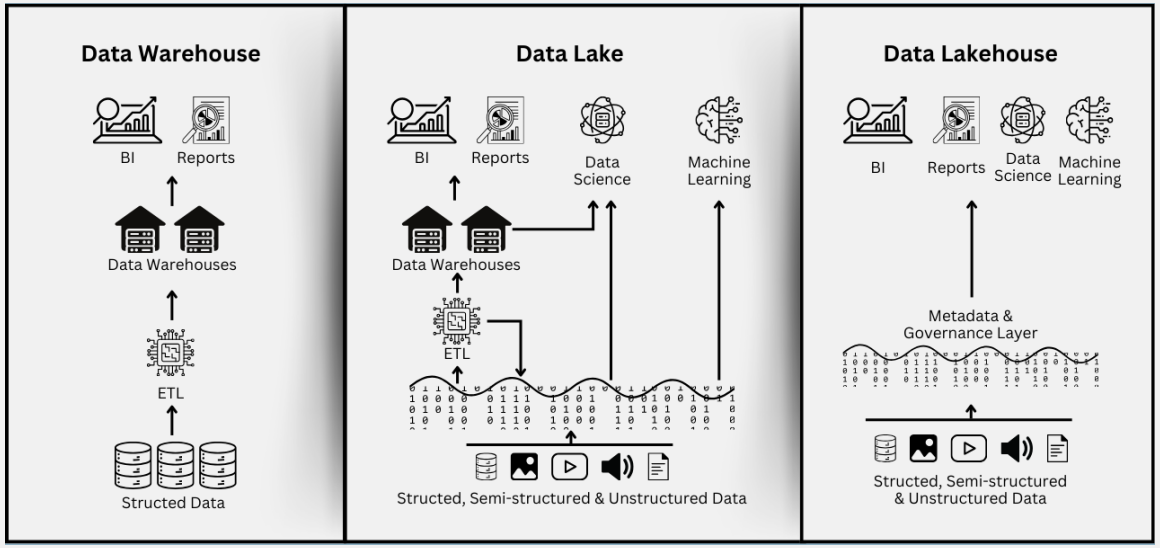
Data Lake

A **data lake** is a storage system that holds raw, unprocessed data — including files, videos, logs, and more.

Data Hub

A **data hub** is a central place where different systems share and exchange data in real time.

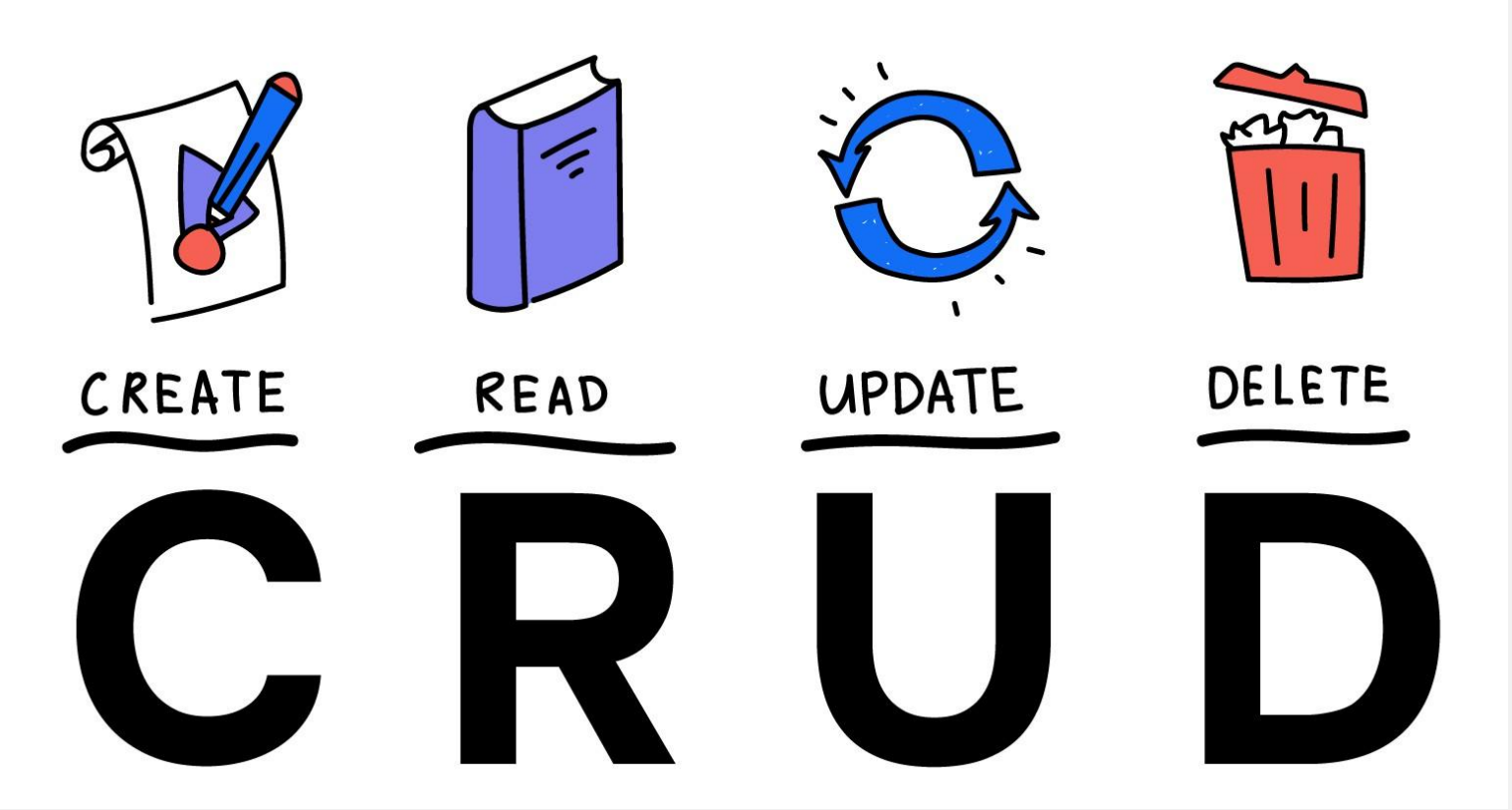




What is SQL?

SQL (Structured Query Language) is a programming language used to interact with database

SQL Application



CRUD is an acronym for CREATE, READ(SELECT), UPDATE, and DELETE statements in SQL

SQL Databases

SQL v/s NoSQL

Relational Database	Non-Relational Database
SQL database	NoSQL database
Data stored in tables	Data stored are either key-value pairs, document-based, graph databases or wide-column stores
These databases have fixed or static or predefined schema	They have dynamic schema
Low performance with huge volumes of data	Easily work with huge volumes of data
Eg: PostgreSQL, MySQL, MS SQL Server	Eg: MongoDB, Cassandra, Hbase

SQL Commands

There are mainly 5 types of SQL commands:

- **DDL** (Data Definition Language): used to define and modify the structure of database

  create, alter, drop, truncate, rename

- **DML** (Data Manipulation Language): used to manage data inside tables

  insert, update and delete

- **DCL** (Data Control Language): used to control access to data in the database.

  grant , revoke permission to users

- **DQL (Data Query Language) :** Used to retrieve data from the database.

  select

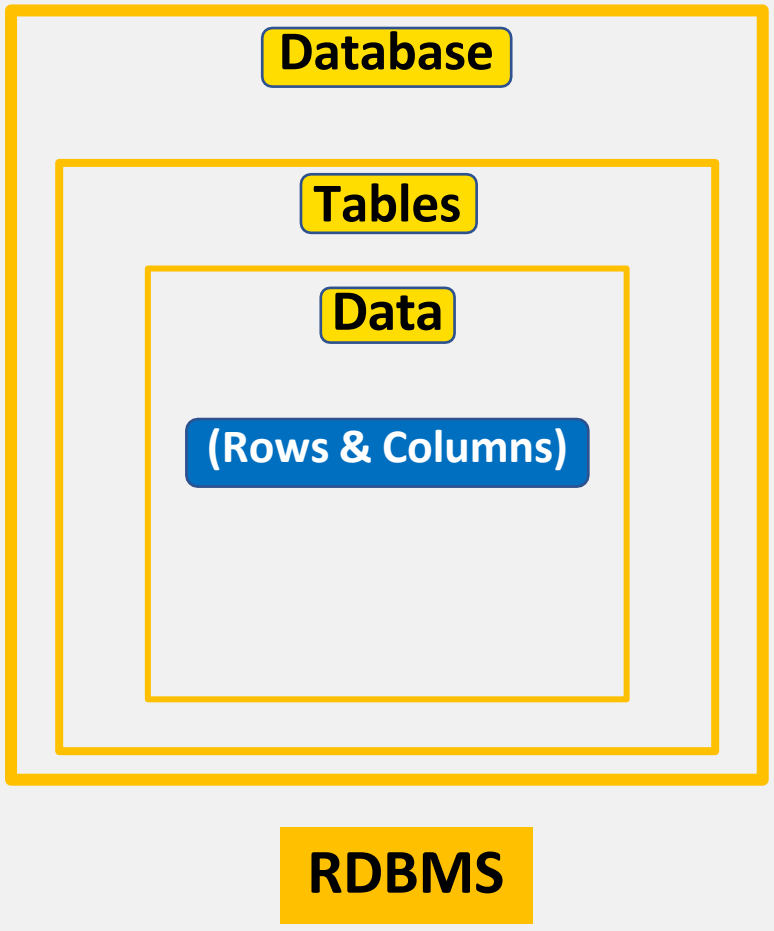
- **TCL (Transaction Control Language):** Used to manage transactions and ensure data integrity.
  commit, savepoint, rollback, set transaction

SQL keywords are reserved words that define the structure and behavior of SQL commands. They cannot be used as table or column names and are essential for writing queries.

SQL keyword	Description
SELECT	Retrieves data from one or more tables.
FROM	Tables involved in the query. Required in every SELECT.
WHERE	Criteria for selection that determine the rows to be retrieved, deleted or updated. Optional in a SQL query or a SQL statement.
GROUP BY	Criteria for grouping rows. Optional in a SELECT query.
ORDER BY	Criteria for ordering rows. Optional in a SELECT query.
INNER JOIN	Merge rows from multiple tables.
INSERT	Insert rows into a specified table.
UPDATE	Update rows in a specified table.
DELETE	Delete rows from a specified table.

DATA TYPES, PRIMARY & FOREIGN KEYS, CONSTRAINTS

SQL Structure



Example

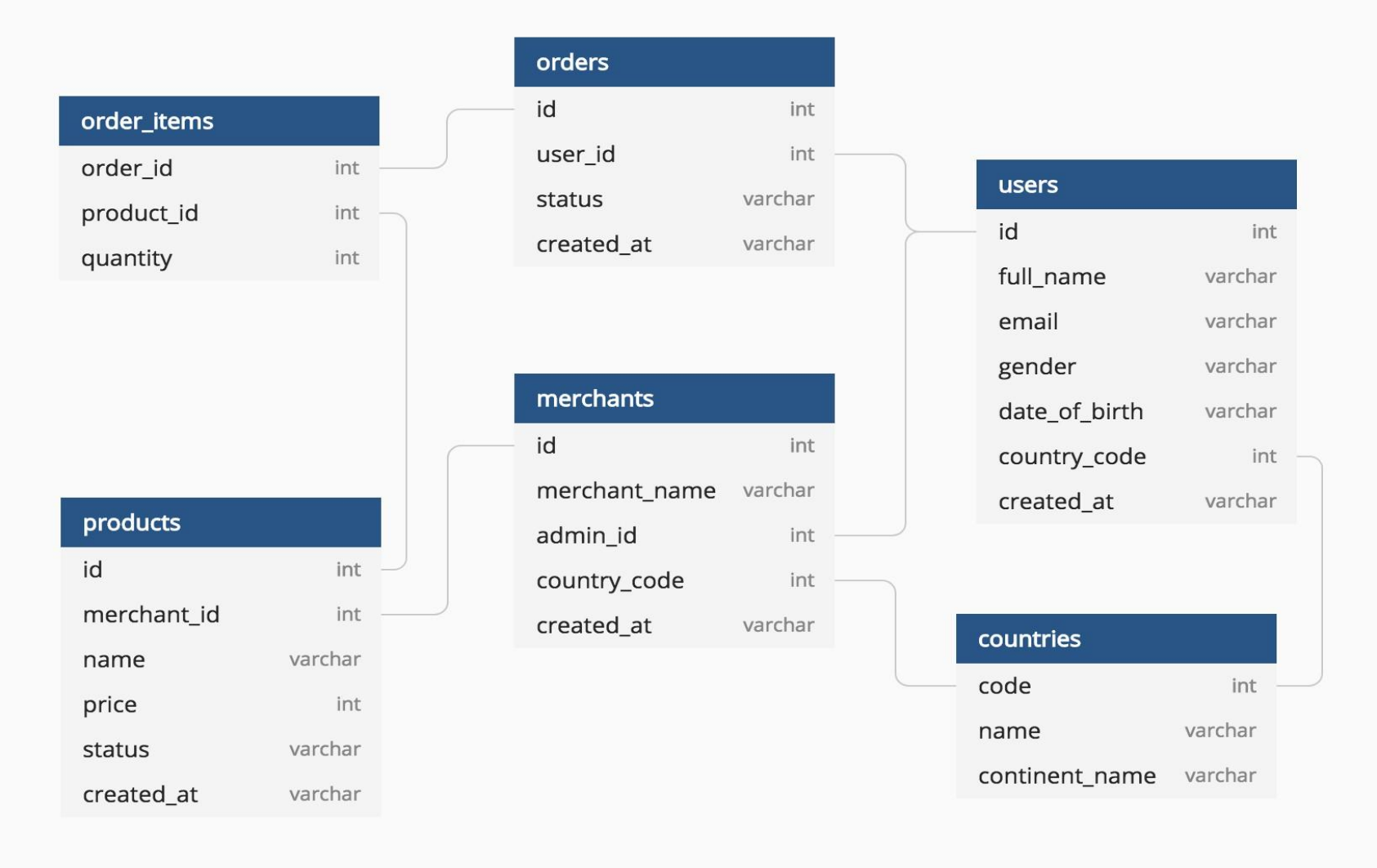
Columns

Rows

```
mysql> SELECT* FROM employee;
+--------+----------+--------------------+---------+---------+
| emp_id | emp_name | emp_dept           | emp_age | emp_sex |
+--------+----------+--------------------+---------+---------+
| E00001 | JHONNY   | BACKEND DEVELOPER  |      26 | male    |
| E00002 | DARSHI   | NULL               |      27 | male    |
| E00003 | JASMINE  | NULL               |      37 | female  |
| E00004 | LILLY    | NULL               |      47 | female  |
| E00005 | RONALD   | UI DEVELOPER       |      26 | male    |
+--------+----------+--------------------+---------+---------+
5 rows in set (0.01 sec)
```

Schema Diagram

A schema is the **blueprint** of a database — it defines how data is organized.



Example

Creating Database & Tables

- Data types
- Primary & Foreign keys
- Constraints
- SQL Commands
  - CREATE
  - INSERT
  - UPDATE
  - BACKUP
  - DELETE
  - ALTER
  - DROP, TRUNCATE

Data Types

- Data type of a column defines what value the column can store in table
- Defined while creating tables in database
- Data types mainly classified into three categories + most used
  - String: char, varchar, etc
  - Numeric: int, float, bool, etc
  - Date and time: date, datetime, etc

Data Types

Commonly Used data types in SQL:

- **int:** used for the integer value
- **float:** used to specify a decimal point number
- **bool:** used to specify Boolean values true and false
- **char:** fixed length string that can contain numbers, letters, and special characters
- **varchar:** variable length string that can contain numbers, letters, and special characters
- **date:** date format YYYY-MM-DD
- **datetime:** date & time combination, format is YYYY-MM-DD hh:mm:ss

Primary and Foreign Keys:

Primary key (PK):

- A Primary key is a unique column we set in a table to easily identify and locate data in queries
- A table can have only one primary key, which should be unique and NOT NULL

Foreign keys (FK):

- A Foreign key is a column used to link two or more tables together
- A table can have any number of foreign keys, can contain duplicate and NULL values

Constraints

- Constraints are used to specify rules for data in a table
- This ensures the accuracy and reliability of the data in the table
- Constraints can be specified when the table is created with the CREATE TABLE statement, or
- after the table is created with the ALTER TABLE statement
- Syntax

```
CREATE TABLE table_name (
  column1 datatype constraint,
  column2 datatype constraint,
  column3 datatype constraint,
  ....
);
```

Constraints

Commonly used constraints in SQL:

- NOT NULL - Ensures that a column cannot have a NULL value
- UNIQUE - Ensures that all values in a column are different
- PRIMARY KEY - A combination of a NOT NULL and UNIQUE
- FOREIGN KEY - Prevents actions that would destroy links between tables (used to link multiple tables together)
- CHECK - Ensures that the values in a column satisfies a specific condition
- DEFAULT - Sets a default value for a column if no value is specified
- CREATE INDEX - Used to create and retrieve data from the database very quickly

Install SQL Server

(Postgre SQL)

Better to follow latest installation guide

- Postgre Sql installer
- Mysql installer
- Microsoft Sql Sever installer

CRUD
Creating Database & Tables

Crud Operations : Download

Create DataBase

The **create database** statement helps us to create database

- **Syntax:** **CREATE DATABASE** databasename;
- **Example:** **CREATE DATABASE** student;

Delete Database

To delete a database we use **DROP DATABASE** statement and it will remove everything in database

- **Syntax:** **DROP DATABASE** databasename;
- **Example:** **DROP DATABASE** student;

Note: Make sure before drop the database backup everything and make sure you disconnect from the database

Create Table

The CREATE TABLE statement is used to create a new table in a database

- **Syntax**

```
CREATE TABLE table_name
(
   column_name1 datatype constraint,
   column_name2 datatype constraint,
   column_name3 datatype constraint,
);
```

- **Example**

```
CREATE TABLE customer
(
   CustID  int8  PRIMARY KEY,
   CustName  varchar(50) NOT NULL,
   Age  int  NOT NULL,
   City  char(50),
   Salary  numeric
);
```

Insert, Update, Delete Values in Table

+

Alter, Drop & Truncate Table

Insert Values In Table

The INSERT INTO statement is used to insert new records in a table

- **Syntax**

```
INSERT INTO TABLE_NAME
(column1, column2, column3,...columnN)
VALUES
(value1, value2, value3,...valueN);
```

- **Example**

```
INSERT INTO customer
(CustID, CustName, Age, City, Salary)
VALUES
(1, ‘Sam’, 26, ‘Delhi’, 9000),
(2, ‘Ram’, 19, ‘Bangalore’, 11000),
(3, ‘Pam’, 31, ‘Mumbai’, 6000),
(4, ‘Jam’, 42, ‘Pune’, 10000);
```

Other ways to insert data

```
INSERT INTO customer(CustID, CustName,
Age, City, Salary)
values(5, ‘Ramya’, 19, ‘Bangalore’, 14000),
```

```
INSERT INTO customer
values(6,'teja',24,’Kochi’,15000);
```

Update Values In Table

The UPDATE command is used to update existing rows in a table

- **Syntax**

```
UPDATE TABLE_NAME
SET “Column_name1” = ‘value1’, “Column_name2” = ‘value2’
WHERE “ID” = ‘value’
```

- **Example**

```
UPDATE customer
SET CustName = 'Xam’, Age= 32
WHERE CustID = 4;
```

ALTER Table

The ALTER TABLE statement is used to add, delete, or modify columns in an existing table

ALTER TABLE - ADD Column

Syntax

```
ALTER TABLE table_name
ADD COLUMN column_name ;
```

Example: add email column to customer table

```
ALTER TABLE customer
ADD Email VARCHAR(100);
```

ALTER TABLE – Modify COLUMN Data Type

Syntax

```
ALTER TABLE  table_name
ALTER COLUMN column_name
TYPE newdatatype;   -- postgresql
```

Example: change Salary from NUMERIC to INT

```
ALTER TABLE customer
ALTER COLUMN Salary TYPE INT;
```

```
ALTER TABLE customer
MODIFY Salary INT;          -- For mysql
```

ALTER TABLE - RENAME COLUMN

Syntax

```
ALTER TABLE table_name
RENAME COLUMN column_name TO
new_Column_name;
```

Example: rename CustName to CustomerName:

```
ALTER TABLE customer
RENAME COLUMN CustName TO
CustomerName;
```

ALTER TABLE - DROP COLUMN

Syntax

```
ALTER TABLE table_name
DROP COLUMN column_name;
```

Example: remove the City column:

```
ALTER TABLE customer
DROP COLUMN City;
```

Delete Values In Table

The DELETE statement is used to delete existing records in a table

- **Syntax**

```
DELETE
FROM table_name
WHERE condition;
```

- **Example**

```
DELETE
FROM customer
WHERE CustID = 3;
```

Drop & Truncate Table

The DROP TABLE command deletes a table in the database

- **Syntax**

  DROP TABLE table_name;

  Example **DROP TABLE customer**

The TRUNCATE TABLE command deletes the data inside a table, but not the table itself

- **Syntax**

  TRUNCATE TABLE table_name;

  Example

  TRUNCATE TABLE customer

SELECT Statement

The SELECT statement is used to select data from a database.

- **Syntax**

```
SELECT column_name FROM table_name;
```

To select all the fields available in the table

- **Syntax**

```
SELECT * FROM table_name;
```

To select distinct/unique fields available in the table

- **Syntax**

```
SELECT DISTINCT Column_name FROM table_name;
```